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Research Product 84-16

Development of an Advanced Rifle Marksmanship Program of Instruction

ARI Field Unit at Fort Benning, Georgia
Training Research Laboratory

July 1984

U. S. Army Research Institute for the Behavioral and Social Sciences

U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

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The Advanced Rifle Marksmanship (ARM) program existing in 1981 was analyzed and three major problems were identified: (a) limited scope of training; (b) inappropriate automatic fire and night fire training, and (c) inadequate feedback (bullet location information). An extensive analysis of Army Training and Evaluation Programs was performed for both the Infantry (ARTEP 7-15) and the Mechanized Infantry (ARTEP 71-2). This analysis attempted to identify the most important marksmanship skills required by Infantrymen, but which had not been taught in the Basic Rifle Marksmanship program. (Continued)

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Development of an Advanced Rifle Marksmanship Program of Instruction

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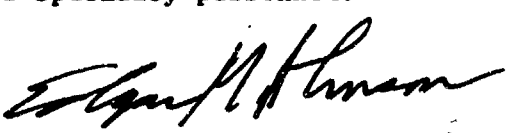
FOREWORD

The Army Research Institute Fort Benning Field Unit conducts research toward improving Marksmanship Training Programs used by the Army. Previous research produced the Basic Rifle Marksmanship (BRM) program which has been fully implemented at all Army Training Centers conducting Initial Entry Training. This report traces the development of the Advanced Rifle Marksmanship Program of Instruction which provides training in many of the additional critical rifle skills required of the infantryman. The acquisition of these skills will better prepare the infantryman for M16A1 rifle marksmanship training at the unit level. This research was performed as part of the overall Army Research Institute program in Education and Training of Soldiers.

During May 1982, the Advanced Rifle Marksmanship Program of Instruction was fully implemented at Fort Benning, Georgia, as part of the One Station Unit Training for 11B Military Occupational Specialty personnel.



EDGAR M. JOHNSON
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DEVELOPMENT OF AN ADVANCED RIFLE MARKSMANSHIP PROGRAM OF INSTRUCTION

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CONTENTS (continued)

RATIONALE FOR AN IMPROVED ADVANCED RIFLE MARKSMANSHIP (ARM) PROGRAM OF INSTRUCTION (POI)

The ARM POI existing in 1981 was reviewed by staff researchers. This review involved extensive field observations, direct participation, and informal interviews with Infantry Training Group (ITG) personnel at Fort Benning, Georgia. Three major problems were identified: (a) limited scope of training; (b) inappropriate automatic fire and night fire training; and, (c) inadequate feedback (bullet location information). This review also led to the development of new training materials, targetry, and devices. Problems and significant training developments are summarized below.

Limited Scope of Training

Previously, the ARM POI was divided into five periods, four relating to automatic fire and one relating to night fire. Not too surprisingly, many people thought the acronym "ARM" stood for "Automatic Rifle Marksmanship." It was the opinion of the researchers that if the ARM program was to be truly advanced, as its name implies, then this program must teach the 11B soldier the essential marksmanship skills, in addition to automatic fire and night fire, needed to perform effectively in an Infantry unit.

The need for a revised ARM POI also was underscored by the Army's plans to replace selected rifle marksmanship live-fire ranges with the Infantry Remoted Target System (IRETS). IRETS was designed to enable the development of realistic, threat-oriented scenarios, where success depends on high levels of marksmanship skills. For example, the proposed qualification course attempts to simulate an enemy attack against a defending position. It involves engaging single and multiple moving targets at ranges between 15 and 185 meters. These targets appear without warning, may charge or retreat, are intermixed with stationary targets (25-300 meters), and move at varying speeds. Target exposure times, generally, are less than on the current BRM qualification course. Further, more targets are exposed simultaneously (as many as seven targets at once) than on the current qualification course (as many as three targets at once). It also encourages soldiers to fire more than one bullet at each target and entails at least two magazine changes. Obviously, this is an advanced course of fire requiring advanced skills.

In order to identify those advanced marksmanship skills critical for the 11B soldier, an extensive analysis of the Infantry and Mechanized Infantry Army Training and Evaluation Programs (ARTEPs 7-15 and 71-2) was performed. Details of this analysis are presented in the next major section of this report. From the analysis of the expected role of small arms in Infantry missons, the following three skills were identified for inclusion in an improved ARM program: quick fire, rapid semi-automatic and suppressive fire, and moving target engagement.

Quick Fire

Quick fire is a rapid-fire technique emphasizing the use of well-directed (as opposed to well-aimed) fire. The technique involves quickly directing the barrel of the rifle toward the target; the rifle's sights are not used. This technique can be very effective when it is employed against targets at ranges less than 30 meters. It also may be effective in urban environments, where close-up threat targets are likely to appear too suddenly to use the rifle's sights. A chapter of FM 23-9 is devoted to quick fire training.

Rapid Semi-automatic Fire and Suppressive Fire

Rapid semi-automatic fire represents a logical extension of skills taught in BRM. The four fundamentals are still taught in rapid semi-automatic fire training; the only difference is that the soldier is trained to employ these fundamentals in a minimum amount of time. During BRM training, the soldier is allowed at least 3 seconds to fire each round. During ARM rapid semi-automatic fire training, the goal is to train soldiers to fire effectively at about twice this rate.

The need for suppressive fire training was evidenced by the aforementioned ARTEP analysis. Relatively few opportunities exist in a combat environment to fire at clearly defined targets. More frequently, soldiers are required to fire at poorly defined point and area targets (or suspected enemy locations) that are at least partially covered or concealed. Here, accuracy of fire and a high volume of fire appear about equally important. Rapid semi-automatic and suppressive fire training in ARM represents an attempt to get away from the clearly defined silhouette targets found in BRM.

In lieu of constructing a range specifically for suppressive fire training, a realistic paper target was developed for this purpose. The "25-Meter Scaled Landscape Suppressive Fire Target" (Figure 1) enables soldiers to learn rapid semi-automatic and suppressive fire techniques on a 25-meter range. Since the target is scaled, the firer receives the same visual perception in relation to the rifle's front sight post as he would in firing at a house window at 200 meters, a fence or hedgerow at 250 meters, or an armored vehicle at 300 meters. Furthermore, precise bullet location information can be obtained by walking down range and inspecting the target. (Point of bullet impact equals point-of-aim when firing with the long range sight at 25 meters).

Moving Target Engagement

Impetus for the creation of a moving target POI stems from a long recognized Army training need. Moving targets are the type most frequently encountered on the battlefield and are more difficult to hit than stationary targets. Until recently, however, training developments have been frustrated by a lack of suitable range facilities. Now that the Army has plans to field range facilities that include moving targets, more attention is being given to the problems associated with training soldiers to hit these targets.

Figure 1. 25-Meter Scaled Landscape Suppressive Fire Target (46% reduction of actual)

The initial phase of ARM moving target engagement training was conducted on a 25-meter range, with each soldier firing at a paper target that had three scaled, simulated running silhouettes printed on it (hereafter referred to as the "25-Meter Scaled Simulated Moving Target"). The original version of this target was developed to facilitate speed in the initial aiming process and a good understanding of lead requirements. It also offered several important advantages over the use of IRETS moving targets. For example, it is inexpensive and requires no maintenance, can be set up in large numbers on any 25-meter range allowing many soldiers the chance to train at one time, and provides precise bullet location information.

Additional training included dry firing at a moving target simulator, hereafter referred to as the Dry Fire Moving Target Engagement Trainer or DRY MOVER (Figure 2). DRY MOVER was primarily designed to enhance tracking skills. Further, it can be used to conduct low-cost dry fire training in all aspects of moving target engagement. DRY MOVER offers both cost savings and increased training opportunities. For example, an IRETS moving target costs about $11,000 and provides training for one soldier at a time; DRY MOVER is a TASC device (TAD-239) that can be built for less than $500 in parts and labor, and it allows 15 soldiers to train at a time. Of course, DRY MOVER is intended to be an adjunct to moving target training, rather than a replacement for IRETS moving targets.

Following training with the 25-Meter Scaled Simulated Moving Target, the DRY MOVER, and a second dry fire exercise (to be described later), soldiers fired at IRETS moving targets. Thus, ARM moving target engagement training was designed to conserve resources, as well as to equip soldiers with the skills necessary to maximize the value of subsequent live-fire training.

Inappropriate Automatic Fire and Night Fire Training

Automatic Fire Training

In the previous ARM program, a soldier could increase his score on any automatic fire scenario simply by firing the scenario on semi-automatic. Ideally, an appropriately designed automatic fire scenario would enable soldiers to achieve higher scores when firing full automatic, than when firing semi-automatic. Although automatic fire training has been de-emphasized in the current ARM POI, it is still a valid requirement. Appropriate uses of automatic fire include clearing rooms, conducting the final stages of an assault, and providing effective final protective fire in defense.

In order to make the automatic fire training conducted in ARM more appropriate, it was suggested that target exposure times be greatly reduced during automatic field fire. Previously, automatic fire target exposure times were at least 500% longer than the average target exposure times found in BRM. Automatic rifle qualification was never a problem, owing chiefly to its lack of difficulty when compared to the BRM record fire course. It is expected that additional automatic fire training will be given to the 11B soldier in the future when training for the Squad Automatic Weapon (SAW) commences.

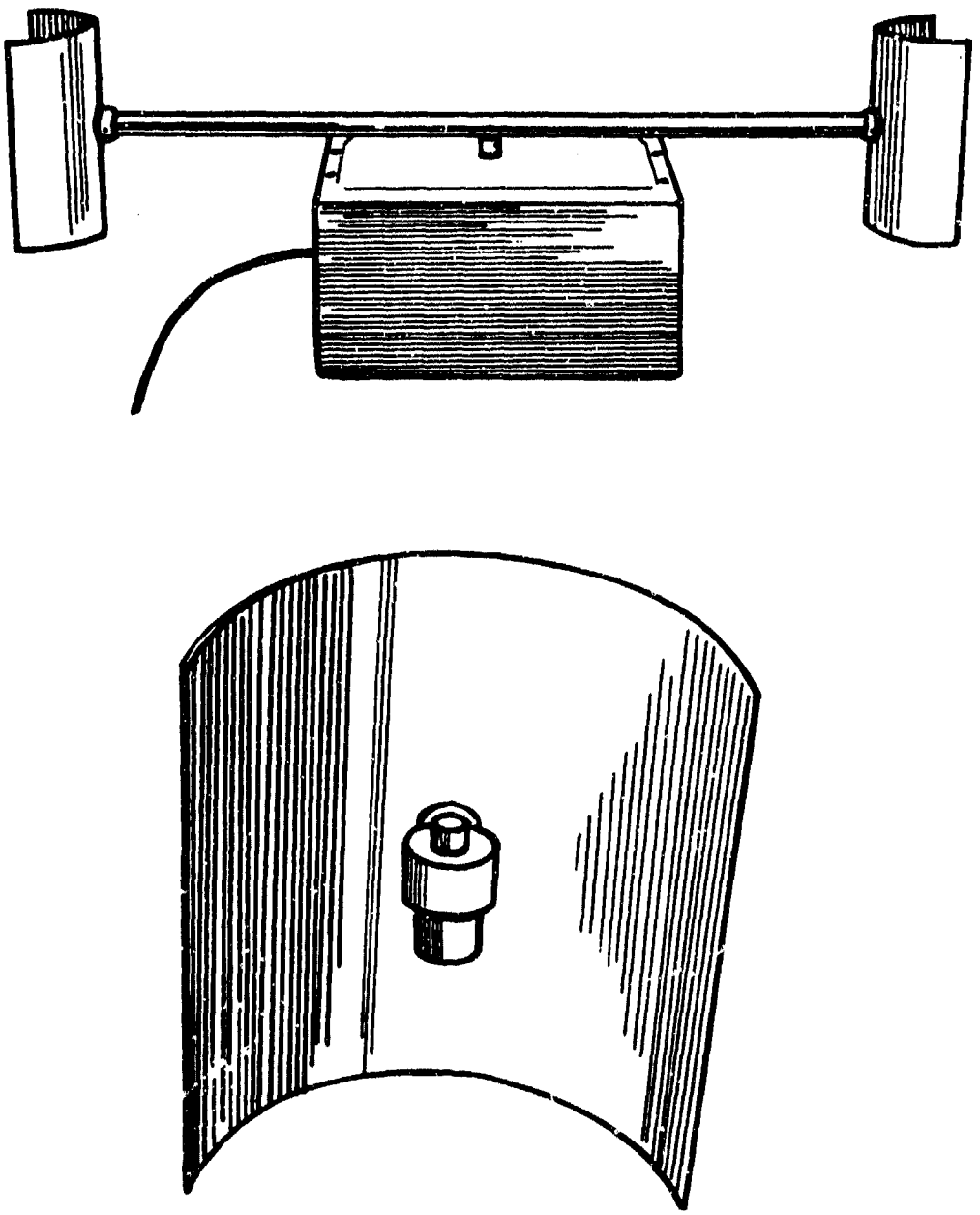

Figure 2. Dry Fire Moving Target Engagement Trainer (DRY MOVER)

Night Fire Training

Previously conducted night fire training was totally inadequate. It amounted to nothing more than firing rounds down range at night. Targets could not be seen, scores were not kept, and soldiers never knew whether or not they hit any targets. When Starlight Scopes were used, they were not zeroed.

Current ARM night fire training is vastly improved. Soldiers now fire using artificial illumination or Starlight Scopes. Training in quick fire and rapid semi-automatic fire transfers positively to the new night fire scenario. The pointing techniques involved in quick fire are basically the same as those employed at night. Rapid semi-automatic fire training also benefits soldiers firing under artificial illumination, since targets are seen clearly for only a limited period of time. The use of zeroed Starlight Scopes also has increased the average number of hits obtained. And, shot location information is obtained by walking down range to inspect and paste targets.

Inadequate Feedback About Bullet Hits and Misses

The previous ARM program failed to provide soldiers sufficient feedback about their shooting results. Feedback is an essential aspect of any training program. Only through feedback can a soldier learn what he is doing wrong and correct his actions. Increases in the quantity (amount) or quality (precision) of feedback almost always lead to faster rates of learning and better performance. Feedback to the soldier about the results of his shooting was increased as much as possible in the new ARM program. Soldiers now walk down range to inspect targets during all 25-meter firing and during night fire.

IDENTIFICATION OF M16A1 ADVANCED RIFLE MARKSMANSHIP TASKS

The goal of an ARM POI should be to teach the 11B soldier those key marksmanship skills, in addition to BRM skills, that he will be required to use upon assignment to an Infantry unit. In order to identify these marksmanship skills, an extensive analysis of ARTEP missions was performed for both the Infantry (ARTEP 7-15) and the Mechanized Infantry (ARTEP 71-2).

Each task within every identified mission in ARTEPs 7-15 and 71-2 was studied in order to determine the expected role of the M16A1 rifle in Infantry missions. For each task within every mission, the following 10 items of information were catalogued:

1. Nature of the target
2. Method of target identification
3. Range to target (meters)
4. Visibility
5. Nature of enemy incoming fire
6. Method of fire coordination
7. Modes of fire
8. Firing position
9. Current measure of rifle effectiveness
10. Indicated marksmanship training tasks

In addition, three items were subjectively rated:

1. Importance of task to the Infantry soldier
2. Mission importance
3. Frequency of mission performance

A specially designed form was used throughout the skill identification phase of the ARTEP analysis (Figure 3).

Results of the ARTEP analysis indicated several M16A1 rifle marksmanship training tasks that are not taught in detail during the BRM portion of the Infantry One Station Unit Training (OSUT) POI. Seven of these major tasks are:

1. Instinctive automatic fire
2. Sighted automatic fire
3. Quick fire
4. Rapid semi-automatic suppressive fire
5. Night fire
6. Moving target engagement
7. Firing with protective mask

There is no precise procedure for determining which firing tasks will be performed in particular missions. However, the expected relationship between these seven tasks and each mission identified in ARTEPs 7-15 and 71-2 have been summarized in Appendices A and B. Training for all but one of these tasks was included in the new ARM POI. This POI is the next section of this report.

IDENTIFICATION OF MARKSMANSHIP TASKS TO ACCOMPLISH ARTEP MISSIONS

ARTEP ☐ 7-15 ☐ 71-2

ARTEP MISSION _____ Performed by ☐ Squad ☐ Platoon ☐ Company ☐ Battalion

Mission Importance (Least Important 1 2 3 4 5 6 7 8 9 10 Most Important) Frequency of Mission Performance (Seldom 1 2 3 4 5 6 7 8 9 10 Often)

(1) ARTEP TASK	(2) Nature of Target	(3) Target Identification	(4) Range to Target (M)	(5) Visibility	(6) Enemy Incoming Fire	(7) Fire Coordination	(8) Mode of Fire *AR	(9) Firing Position	(10) Current Measure of Rifle Effectiveness	(11) Indicated Marksmanship Training Tasks	(12) Importance to Infantry Soldier (nice to have 12345678910 critica	(13) Notes

Figure 3. ARTEP Analysis Data Collection Form

M16A1 ADVANCED RIFLE MARKSMANSHIP PROGRAM OF INSTRUCTION

The overall purpose of this 24-hour POI was to train soldiers to hit targets with their M16A1 rifles using the quick-fire technique, to employ effective rapid semi-automatic and suppressive fire, to hit targets using automatic fire, to hit targets while wearing the protective mask, to hit targets at night, and to hit moving and briefly exposed targets.

Period 1: Quick Fire (4 Hours)

Special Materials and Devices

None.

Objective

Task. Engage close-range targets using the quick-fire technique.

Conditions. During daylight hours on a 25-meter range; given an M16A1 rifle with sights taped, three 10-round magazines of 5.56mm ball ammunition, and an E-type silhouette with a painted circle 2 to 3 inches wide in the lower third of the target; using the quick fire firing position. From the quick fire "ready" position, each soldier assumes the quick fire "firing" position and fires one round. This procedure is repeated for the firing of each subsequent round. The first and second ten rounds are fired at a distance of 15 meters from the silhouette target. The final 10 rounds are fired 25 meters from the target.

Standards. Each soldier must, within 20 seconds, obtain seven target hits out of the second 10 rounds fired at 15 meters. Each soldier must, within 20 seconds, obtain five target hits out of the 10 rounds fired at 25 meters.

References. FM 23-9, Chapter 8.

Task. Practice rapid magazine change.

Conditions. During daylight hours in a concurrent training area; given an explanation, demonstration, and practical application with an M16A1 rifle and two empty magazines.

Standards. Each soldier must correctly perform a rapid magazine change within five seconds.

Task. Practice the prone supported, prone unsupported, kneeling supported, kneeling unsupported, standing, alternate shoulder, and quick-fire firing positions.

Conditions. During daylight hours in a concurrent training area; given an explanation, demonstration, and practical application with an M16A1 rifle and sandbags for support.

Standards. In accordance with FM 23-9.

Period 2: Rapid Semi-Automatic and Suppressive Fire (4 Hours)

Special Materials and Devices

25-Meter Scaled Landscape Suppressive Fire Target. The 25-Meter Scaled Landscape Suppressive Fire Target (Figure 1) was designed to train soldiers in rapid semi-automatic fire and suppressive fire techniques on a 25-meter range. With a height of 37 inches and a width of 72 inches, this locally-printed paper target was backed with triple corrugated fiberboard (NSN 8135-00-926-4908) and mounted on existing target frames. Three target areas are presented to the firer: an open window in a house, a fence and hedgerow, and a tank turret. Since the target is scaled, the firer receives the same visual perception in relation to the rifle's front sight post as he would in firing at a house window at 200 m, a fence or hedgerow at 250 m, or an armored vehicle at 300 m. Dotted lines surround each of the three target areas, and rounds impacting within the dotted borders are considered to be hits for the purpose of suppression.

Objective

Task. Engage scaled silhouette targets using rapid semi-automatic fire.

Conditions. During daylight hours on a 25-meter range; given an M16A1 rifle, two 10-round magazines of 5.56mm ball ammunition, and 25-Meter Scaled Silhouette Timed Fire Target (Figure 4); using the prone supported firing position. Each soldier must fire two rounds at each of the ten silhouettes on the Timed Fire Target using rapid semi-automatic fire.

Standards. Each soldier must obtain 14 silhouette target hits within 45 seconds.

Task. Engage a scaled landscape target using suppressive fire.

Conditions. During daylight hours on a 25-meter range; given an M16A1 rifle, a 25-Meter Scaled Landscape Suppressive Fire Target (Figure 1), and one 12-round magazine, one 9-round magazine, and three 3-round magazines of 5.56mm ball ammunition; using the foxhole supported firing position. Using rapid semi-automatic fire, each soldier must fire nine rounds at the "open window" area of the target and twelve rounds at the "fence/hedgerow" area of the target. Using automatic fire, each soldier must fire three 3-round bursts at the "tank turret" area of the target.

Standards. Each soldier must obtain 10 hits inside the dotted lines surrounding the "fence/hedgerow" area within 24 seconds, 5 hits inside the "open window" area within 18 seconds, and 3 hits inside the "tank turret" area (no time limit).

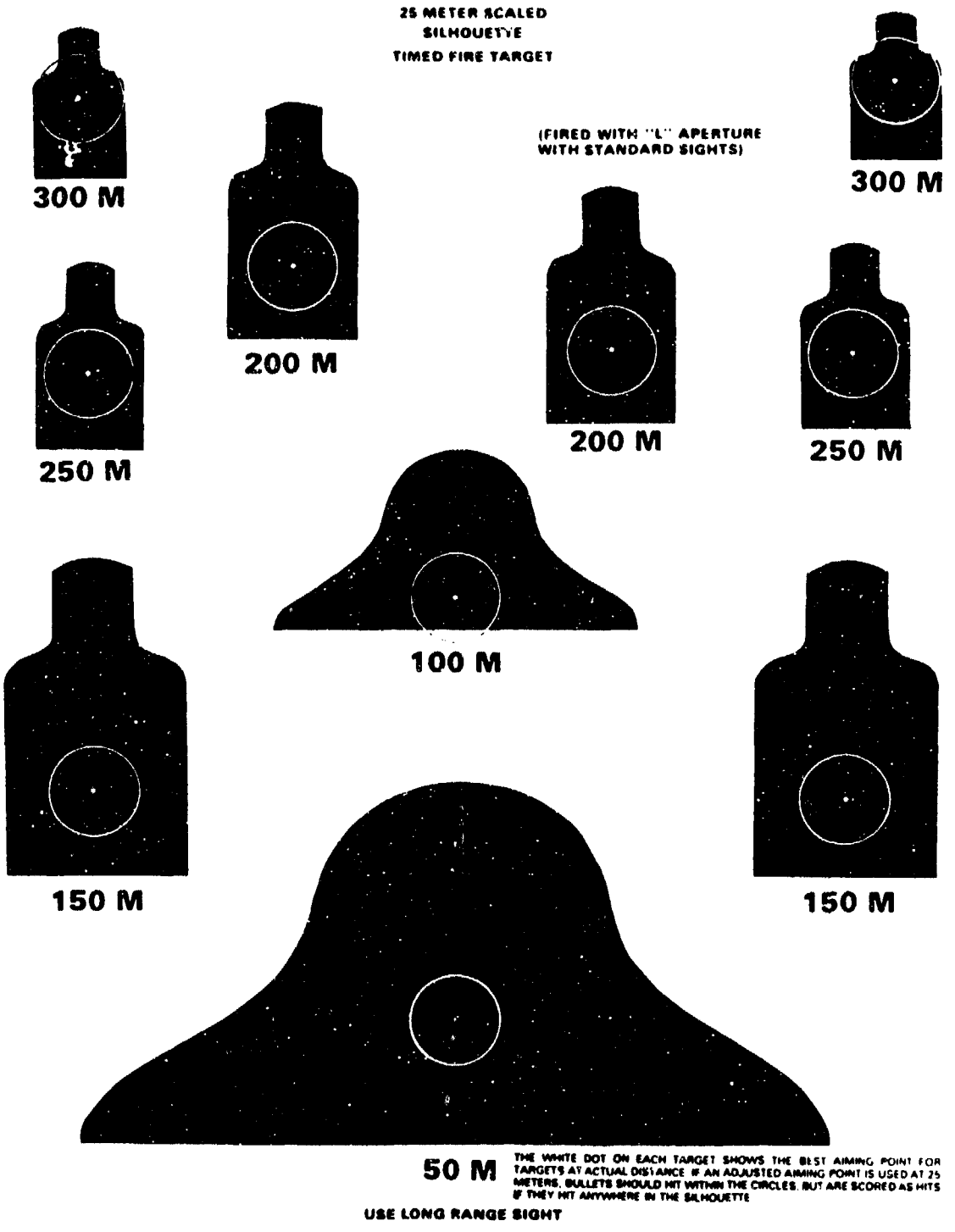

Figure 4. 25-Meter Scaled Silhouette Timed Fire Target
(25% reduction of actual)

Task. Practice the foxhole bipod-supported and prone bipod-supported firing positions.

Conditions. During daylight hours in a concurrent training area; given an explanation, demonstration, and practical application with an M16A1 rifle and M3 bipod.

Standards. Each soldier must correctly assume the foxhole bipod-supported position and prone bipod-supported position.

Period 3: Automatic Rifle Field Fire (4 Hours)

Special Materials and Devices

None.

Objective

Task. Engage Field Fire silhouette targets using automatic fire.

Conditions. During daylight hours on a modified field fire range, given an M16A1 rifle, M3 bipod, six 15-round magazines and two 3-round magazines of 5.56mm ball ammunition. Each soldier must fire the final 15 rounds while wearing the M17 protective mask.

Standards. Each soldier must obtain a minimum of 16 target hits (Table 1).

Task. Mount/dismount AN/PVS-4 sight on an M16A1 rifle.

Conditions. In daylight or with artificial light source; given an AN/PVS-4 sight in shipping container, mounting knob assembly, and an M16A1 rifle.

Standards.

a. Mounting: Within 5 minutes, position the sight in the groove on top of the M16A1 carrying handle and align the threaded hole in the base of the sight mounting adapter over the hole in the carrying handle. Insert the mounting knob assembly through the hole in the handle and screw firmly clockwise into sight mounting adapter.

b. Dismounting: Within 1 minute, remove the sight and mounting knob assembly and return them to the carrying case.

References. TM 11-5855-213-10.

Task. Place an AN/PVS-4 into operation.

Conditions. During daylight or with artificial light source; given an AN/PVS-4 sight, mounting knob assembly, and an M16A1 rifle.

Table 1
SCORECARD - AUTOMATIC RIFLE
(MODIFIED FIELD FIRE RANGE)

LAST NAME - FIRST NAME - MIDDLE INITAL	UNIT	DATE

ROSTER NUMBER	FIRING ORDER	FIRING POINT

SEQUENCE A

POSITION	RANGE (M)	ROUNDS FIRED	EXPOSURE TIME (SEC)	MAX TGT KILLS	SCORE (TGT KILL)
PRONE BIPOD SUPPORTED	75	3	10	1	
"	75/175	12	40	4	
"	175	9	30	3	
"	175	9	30	3	
"	75/175	12	40	4	
"	75	3	10	1	
			SUBTOTAL	16	

SEQUENCE B

POSITION	RANGE (M)	ROUNDS FIRED	EXPOSURE TIME (SEC)	MAX TGT KILLS	SCORE (TGT KILL)
FOXHOLE BIPOD SUPPORTED	75	3	10	1	
"	75/175	12	40	4	
"	175	9	30	3	
"	75	3	10	1	
"	75/175	12	40	4	
"	175	9	30	3	
			SUBTOTAL	16	
			GRAND TOTAL	32	

Standards. Turn the AN/PVS-4 on and position the rubber eyeguard around the eye. Sight through the scope and position the aiming reference lines of the sight reticle on a target.

References. TM 11-5855-213-10.

Task. Select the correct point-of-aim for a moving personnel target.

Conditions. During daylight hours in a concurrent training area equipped with Simulated Moving Dry Fire Target Panels (see "Special Materials and Devices" section of Period 5); given an M16A1 rifle and sandbags for support; utilizing the foxhole semi-supported and prone unsupported firing positions.

Standards. Each soldier must be able to verbalize the principles of moving target engagement.

Period 4: Night Fire (4 Hours)

Special Materials and Devices

None.

Objective

Task. Engage targets at night under artificial illumination.

Conditions. At night, on a field fire range; given an M16A1 rifle with M3 bipod and 36 rounds of 5.56mm ball ammunition; under artificial illumination; utilizing the foxhole supported and prone unsupported firing positions to engage a 75-meter, E-type silhouette target.

Standards. With 30 seconds for each firing position, each soldier must obtain a total of 18 target hits.

Task. Engage targets with either the AN/PVS-2 or AN/PVS-4.

Conditions. At night, on a field fire range; given either an AN/PVS-2 or AN/PVS-4 sight zeroed on an M16A1 rifle, weapon adapter bracket (AN/PVS-2), mounting knob assembly (AN/PVS-4), M3 bipod, and 18 rounds of 5.56mm ball ammunition; utilizing the prone unsupported firing position to engage a 75-meter, E-type silhouette target.

Standards. Each soldier must obtain a minimum of 15 target hits within 60 seconds.

References. FM 23-9; TM 11-5855-213-10.

Task. Conduct surveillance using either an AN/PVS-2 or AN/PVS-4.

Conditions. At night, in a concurrent training area; given a hand-held AN/PVS-2 or AN/PVS-4 in defensive position, and one enemy squad moving within the assigned sector.

Standards. Detect and report all movement out to 300 meters in open areas within the assigned sector of observation.

References. FM 23-9; TM 11-5855-213-10.

Period 5: Engage Moving Personnel Targets (8 Hours)

Special Materials and Devices

25-Meter Scaled Simulated Moving Target. To facilitate initial aiming as well as to reinforce knowledge of lead, the 25-Meter Scaled Simulated Moving Target was developed. This target has three silhouettes printed on it, each drawn to appear as if it were moving laterally at a different speed (slow, moderate, fast) and range (185 meters, 125 meters, 75 meters). A dotted silhouette, not visible from 25 meters, is offset to the front of each solid silhouette, the amount of offset depending on the target's apparent lateral velocity. During training, troops are instructed to engage the silhouettes as if they were actually moving. Only shots within the dotted silhouettes are scored as hits. Successful engagement of this target depends on the ability to quickly apply three lead rules. These lead rules were designed to incorporate lead requirements for personnel targets moving at varying lateral speeds: (a) slow (top silhouette)--trailing edge of the front sight post against the silhouette's center; (b) moderate (center silhouette)--trailing edge of the front sight post against the leading edge of the silhouette; (c) fast (bottom silhouette)--trailing edge of the front sight post one-half of a sight post's width in front of the silhouette.

Simulated Moving Dry Fire Target Panels. Two sets of Simulated Moving Dry Fire Target Panels were designed to familiarize soldiers with the correct sight pictures associated with three lead rules for laterally moving personnel targets. Locally fabricated by the Training and Audiovisual Support Center at Fort Benning, Georgia, one set of panels is used for dry firing from the prone unsupported firing position, and a second set is used for dry firing from the foxhole semi-supported firing position. Each target panel consists of a 2 foot by 8 foot plywood board subdivided into four 2 foot by 2 foot sections. Each section is utilized by one soldier at a time, allowing four soldiers to train simultaneously at one panel. Six simulated moving silhouettes were designed to appear as though they were either walking, jogging, or running. Further, the silhouettes were scaled to appear as though they were at a distance of either 75, 125, or 185 meters when viewed at a distance of two meters. Three of the six silhouettes were placed on both the upper and lower halves of each section of one target panel set, while the other three silhouettes were similarly placed on the other set of target panels. These six silhouette targets, drawn to actual size, are contained in Figure 5. Soldiers dry fire at the three silhouettes on the lower half of a section, while the upper half is covered with a canvas sheet. After dry firing, soldiers walk two meters to the panel and lift the canvas cover, exposing the upper half of the section. A scaled representation of the rifle sights is superimposed over each silhouette, illustrating the correct sight pictures associated with three different lead rules for laterally moving personnel targets. Soldiers are then able to compare the sight pictures they had used during dry firing with the correct set of sight pictures.

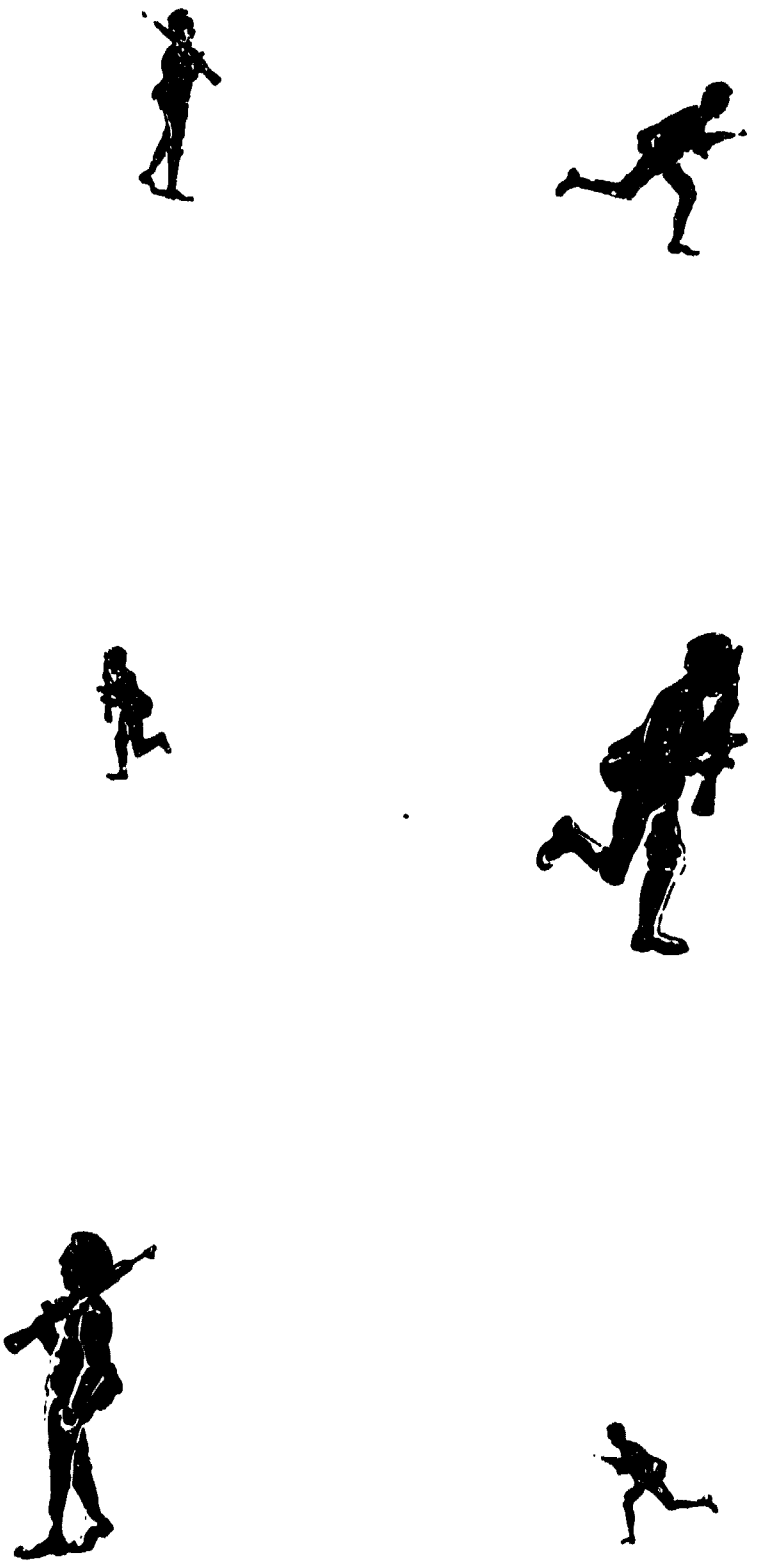

Figure 5. Two-Meter Scaled Silhouettes used in Simulated Moving Dry Fire Target Panels

Dry Fire Moving Target Engagement Trainer. The Dry Fire Moving Target Engagement Trainer (DRY MOVER) was developed to allow soldiers to practice the tasks of smoothly tracking and correctly leading a moving personnel target, prior to live firing. DRY MOVER is a portable, relatively inexpensive training device that consists of two scaled, three-dimensional targets, each situated in front of a curved shield and mounted at the end of an aluminum rod. The rod is seated on a rotating shaft that is driven by a variable speed, reversible, AC motor. The motor is mounted within an aluminum housing (Figure 2). Fifteen soldiers are arranged in a semi-circle (five-meter radius) around the device during training. Target exposure times are controlled by changing the position of the targets relative to the curved shields. DRY MOVER may be configured to simulate the apparent size, speed, and duration of exposure of either the 75-meter or 125-meter IRETS moving targets. Depending on the rod's direction of rotation, targets are seen as moving from right to left (clockwise) or left to right (counterclockwise). Two DRY MOVER devices are used, one for dry firing from the foxhole semi-supported position and one for dry firing from the prone unsupported position.

Objective

Task. Live-fire application of lead rules for moving personnel targets.

Conditions. Given an explanation, demonstration, and practical application with an M16A1 rifle, two nine-round magazines of 5.56mm ball ammunition, sandbags for support, and a 25-Meter Scaled Simulated Moving Target; utilizing the prone supported firing position. Three rounds will be fired at each of the three scaled silhouettes on the target within 12 seconds. Soldiers then walk down range to inspect, score, and paste targets. Procedure is repeated with the second nine rounds.

Standards. Each soldier must obtain a minimum of four hits within each of the three dotted silhouettes on the target.

Task. Dry fire at Simulated Moving Dry Fire Target Panels.

Conditions. During daylight hours in a concurrent training area equipped with Simulated Moving Dry Fire Target Panels (Figure 5); given an M16A1 rifle and sandbags for support; utilizing the foxhole semi-supported and prone unsupported firing positions.

Standards. Each soldier must correctly apply the lead rules required to hit moving personnel targets.

Task. Apply the fundamentals of moving target engagement while dry firing.

Conditions. During daylight hours in a concurrent training area equipped with two DRY MOVER devices (Figure 2); given an M16A1 rifle and sandbags for support; utilizing the foxhole semi-supported and prone unsupported firing positions.

Standards. Each soldier must correctly apply the fundamentals of moving target engagement in each firing position.

Task. Engage a combination of moving and stationary targets using rapid semi-automatic fire.

Conditions. During daylight hours on a modified field fire range; given an M16A1 rifle, sandbags for support, and two 15-round and two 12-round magazines of 5.56mm ball ammunition; utilizing the foxhole semi-supported and prone unsupported firing positions.

Standards. Each soldier must obtain a minimum of 30 target hits, including at least 11 moving target hits and 19 stationary target hits (Table 2).

References. How to Shoot Moving Personnel Targets with the M16A1 Rifle, a guide produced by the Fort Benning Field Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences (see Appendix C).

Task. Perform operator maintenance on M16A1 rifle.

Conditions. Given an M16A1 rifle, a pointed object (dummy 5.56mm cartridge), and small arms maintenance equipment.

Standards. In accordance with listed performance measures (trainer's supplement #9):

a. Disassemble M16A1 rifle within 2 minutes,
b. Clean and lubricate M16A1 rifle, and
c. Reassemble M16A1 rifle within 2 minutes and conduct a function check.

References. FM 23-9; Trainer's Supplement #9 to Appendix 3, Annex C, POI 21-114, November 1980.

Task. Load, reduce a stoppage, and clear an M16A1 rifle (071-311-2003).

Conditions. In a concurrent training area; given an assembled and operational M16A1 rifle, and a magazine loaded with four rounds of 5.56mm blank ammunition and one dummy 5.56mm cartridge.

Standards. In accordance with listed performance measures (trainer's supplement #10):

a. Load, chamber, and fire a round within 10 seconds,

b. Eliminate stoppages (real or simulated) within 10 seconds by applying immediate action, and

c. Clear the M16A1 rifle within 10 seconds.

References. FM 23-9; Trainer's Supplement #10 to Appendix 3, Annex C, POI 21-114, November 1980.

Ammunition Requirements

The total 5.56mm ball ammunition requirement in the ARM POI is 302 rounds per soldier. A summary of the ammunition requirements for each period is contained in Table 3.

Table 2
SCORECARD - RAPID ENGAGEMENT OF MOVING
AND STATIONARY TARGETS
(MODIFIED FIELD FIRE RANGE)

LAST NAME FIRST MI	UNIT	ROSTER NUMBER	FIRING ORDER	FIRING POINT	DATE

TABLE 1 PRONE UNSUPPORTED

TARGET	RANGE	SECONDS	HIT	MISS	NO FIRE
1	75mvr	15			
2	200				
3	200				
4	200				
5	75mvr	4			
6	75mvr	15			
7	150				
8	150				
9	150				
10	75mvr	15			
11	150				
12	150				
13	150				
14	75mvr	15			
15	150				
16	150				
17	150				
18	75mvr	4			
19	75mvr	4			
20	75mvr	15			
21	200				
22	200				
23	200				
24	75mvr	4			
25	75mvr	4			
		TOTAL 1			

Table 2 (Continued)
SCORECARD - RAPID ENGAGEMENT OF MOVING
AND STATIONARY TARGETS
(MODIFIED FIELD FIRE RANGE)

LAST NAME FIRST MI	UNIT	ROSTER NUMBER	FIRING ORDER	FIRING POINT	DATE

TABLE 2 FOXHOLE SEMI-SUPPORTED

TARGET	RANGE	SECONDS	HIT	MISS	NO FIRE
1	75mvr	15			
2	200				
3	200				
4	200				
5	75mvr	4			
6	75mvr	15			
7	125				
8	125				
9	125				
10	75mvr	4			
11	75mvr	4			
12	75mvr	15			
13	125				
14	125				
15	125				
16	75mvr	4			
17	75mvr	15			
18	200				
19	200				
20	200				
21	75mvr	4			
22	75mvr	4			
		TOTAL 2			

TABLE	HIT	MISS	NO FIRE
1			
2			
TOTAL			

Scorer's Signature

Table 3
SUMMARY OF
AMMUNITION REQUIREMENTS

DODIC	ITEM DESCRIPTION	UNIT	LESSON FILE NO.	ITEMS PER STUDENT	ITEMS PER CLASS PER DMST/PE
A071	Ctg, 5.56 mm	Ea.		302	302
	Ball 193 for Rifle		AR001	(30)	(30)
	M16 10/Clip		AR002	(50)	(50)
			AR003	(96)	(96)
			AR004	(54)	(54)
			AR005	(72)	(72)
A080	Ctg, 5.56 mm	Ea.		4	100
	Blank M200		AR005	(4)	(100)
L312	Signal, Illum,	Ea.			24
	Ground Parachute,		AR004		(24)
	White Star				

EARLY EXPERIENCE WITH REVISED ARM POI

Since the implementation of the revised ARM POI, performance scores have been collected for each instructional period and observations of each training period have been made. Due to the rapidity with which the revised ARM program was implemented (several months), it was anticipated that inevitable problems would arise. While the revised ARM program appears a significant improvement over the previous program, a number of problems have become apparent.[1] Descriptions of these problems and recommendations for their solution follow:

Period 1: Quick Fire 1. Soldiers may have some difficulty understanding the relationship between training in the quick fire technique and its potential use in actual combat situations. The class instructor should stress that quick fire is used to engage close-range targets (30 meters or less) when speed is essential. To better illustrate this point, the instructor might include several examples of combat situations in which quick fire might be used. A demonstration in which an assistant instructor engages an aggressor with quick fire using blank ammunition might increase soldier interest and understanding.

2. During quick fire training, soldiers fire a series of ten rounds in 20 seconds, going from the "ready" position to the "firing" position for each shot. Although this procedure enables large numbers of soldiers to receive training quickly, it lacks combat realism. For example, if one were engaging an enemy soldier with quick fire and missed with the first shot, it would probably be suicide to assume a "ready" position prior to firing the second or third shots. The goal of quick fire training is to hit a close-range target in a minimum amount of time, before he can hit you. Therefore, the importance of obtaining a first-round hit is obvious. To teach a soldier to obtain first-round hits with quick fire, he must practice the task of going from a "ready" position to a "firing" position in which the barrel of his rifle is instinctively aligned with the target. This task should be repeated a maximum number of times during training in order to achieve the highest possible level of learning and performance. That is why the soldier, during training, assumes the "ready" position between shots. During the course of firing 30 rounds in quick fire training, a soldier essentially practices 30 repetitions of the same task. In contrast, if soldiers were to fire 3 shots at a time without assuming the "ready" position between each shot, the quick-fire task would essentially be repeated only 10 times during the course of firing 30 rounds.

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[1] It should be noted that the revised ARM POI was developed for immediate implementation on existing ranges. An ideal program would have been different; for instance, electronic projectile location equipment would have been utilized to improve the feedback provided to soldiers about the location of their hits and misses.

Perhaps the best quick-fire training procedure to meet the dual objectives of cost effectiveness (i.e., the learning gained per round of ammunition expended) and combat relevance would be to introduce separate fire control commands from the range tower for the firing of each shot. Specifically, a "commence fire" command followed by a "cease fire" command two seconds later should be issued for each shot. For those 20 rounds fired from a distance of 15 meters, this would allow several seconds between shots during which time the trainee would determine where the round struck the target and adjust his position accordingly. Firing 10 rounds in 20 seconds does not allow the soldier the time to think about his actions and correct mistakes before subsequent rounds are fired (and are potentially wasted in terms of learning benefits). In addition, the class instructor should clearly explain to the soldiers that assuming the "ready" position between shots is for the purpose of learning to get first-round hits, although in combat one should continue firing until the target falls.

Period 2: Rapid Semi-automatic and Suppressive Fire

1. One problem which became evident during observation of rapid semi-automatic fire training was that many soldiers had apparently lost the zeroes they supposedly obtained during BRM. Although there are a number of possible reasons for this problem, some procedure for making necessary sight changes must be incorporated into Period 2 if soldiers are to perform their best during the remaining ARM periods. (Quick fire and night fire training does not require zeroed rifles because the sights are not used.) It is recommended that assistant instructors (AIs) learn to assist soldiers in refining their zeroes using the Timed Fire Target. Each AI on the firing line should have a nail or other sight changing device with him. Further, he should know that one click of either windage or elevation will move the location of shots .7 cm or 1/4" at 25 meters. Based upon this rule, AIs should be able to make educated guesses about the required number of clicks needed to get a soldier zeroed. However, sight changes should be made only if at least 7 out of 10 shots are displaced in the same direction from center of mass. For example, if most shots fall high right, a sight change is in order to move these shots lower and to the left.

2. Another problem with Period 2 is that many targets are being missed. In addition to the zeroing problem, many soldiers are not applying the four fundamentals of rifle marksmanship. Excessively large shot groups are evidence of this problem. If a soldier fires 10 rounds and 3 miss high, 2 miss left, 2 miss right, and 3 miss low, this person does not have a zero problem. Rather, he has difficulty in correctly applying the fundamentals. Poor trigger squeeze is usually the problem for soldiers having excessively large shot groups. Unfortunately, rapid semi-automatic fire training requires the soldier to fire a round every 2 seconds. This rate of fire is over twice as fast as that required for ERM record fire. This sudden increase in the rate of fire required during ARM rapid semi-automatic fire may overwhelm many soldiers to the point that they become careless in their application of the fundamentals. While it is expected that rapid semi-automatic fire will be less accurate than slow semi-automatic fire, the difference in accuracy

between the two should not be great. In order to ease the transition between typical BRM rates of fire and the faster rate of fire required for rapid semi-automatic fire, it is suggested that the time limits for this exercise be increased. Specifically, the exercise should be divided into two 10-round phases, with a time limit of forty seconds for the first phase and a limit of thirty seconds for the second phase. Walking downrange to inspect targets after each phase will allow for feedback and the opportunity to make needed sight changes.

3. The class on rapid semi-automatic and suppressive fire might be improved if the class instructor presented several examples of their appropriate use in combat. It should be stressed that the majority of rounds fired in combat will be suppressive fire at unseen or briefly exposed targets and suspected enemy locations. Rapid semi-automatic fire is used in situations where a heavy volume of accurate fire is required.

Period 3: Automatic Rifle Field Fire

1. Soldier understanding and interest would be increased if the class instructor presented several examples of the appropriate use of automatic fire in combat (e.g., final protective fire, clearing a room in MOUT, engaging aircraft with small arms, the final stages of an assault).

2. The difference between rifle zeroes obtained with sandbag versus bipod support can be substantial. Since rifles have not been specifically zeroed for use with the bipod, an adjusted aiming point may be required, or the use of sandbag support during automatic fire may increase the number of hits obtained.

3. Currently, automatic fire targets are exposed for a greater period of time than in any other ARM or BRM period. Ideally, the reverse should be the case. Appropriate utilization of automatic fire would occur in situations where time is at a premium. At a minimum, exposure times should be reduced by at least 50%.

Period 4: Night Fire

No major problems are apparent in this class. If scores continue to be within acceptable ranges, consideration should be given to engaging 175-meter targets in addition to 75-meter targets.

Period 5: Engage Moving Personnel Targets

1. ARM moving target engagement training could be improved greatly if the portable IRETS moving targets installed were always operable. For a variety of reasons, these targets have failed to operate for the majority of companies undergoing moving target training.

2. Class instruction could be improved by having a demonstration to illustrate the necessity of leading moving targets (e.g., throwing a football straight at versus in front of a receiver).

3. Soldiers are given 12 seconds to engage the 25-Meter Simulated Moving Silhouette Targets with nine rounds. This means that, on average, one round must be fired every 1-1/3 seconds. This rate of fire is at least as fast as a rapid semi-automatic rate of fire and is contrary to the purpose of the exercise. Two or three seconds per round would be more appropriate, allowing the shooter sufficient time to apply the correct sight rule prior to each shot. A second problem is that the exercise does not place sufficient emphasis on training rapid initial aiming. Three rounds are fired at each silhouette in succession. A better approach would be to have the tower operator signal shooters to engage the three silhouettes one at a time in random order. This may be accomplished by having the operator say "Ready--Top," "Ready--Center," or "Ready--Bottom," prior to each shot, depending on which silhouette is to be engaged. Following each shot, soldiers on the "Ready" line would provide feedback to the shooters about locations of hits and misses. Bullet holes are clearly visible from 25 meters using shooting scopes or binoculars.

4. Soldiers have been instructed to engage moving personnel targets using the "foxhole semi-supported position." Information on which this instruction is based appears in Appendix C. The foxhole semi-supported position differs from a standard foxhole supported position in that it offers the firer the freedom of movement necessary to engage most moving targets. This brings up the question of whether Army marksmanship training should continue to emphasize the foxhole supported position, whether it should emphasize the position considered better overall (foxhole supported position or foxhole semi-supported position), or whether all (or some) soldiers should be trained with both positions. This is a doctrinal problem, but one which needs to be addressed.

5. Initially, the revised ARM POI emphasized the need for four sight rules, one for stationary targets or targets coming directly toward or away from the firer, and three for targets having some lateral movement (see Appendix C). On reexamination (Appendix D), it was determined that three sight rules for targets having some lateral movement were not required. Only one sight rule is required; simply place the trailing edge of the front sight post at target center. This one lead rule causes lead to increase automatically as the range to the target increases, and is appropriate for all IRETS moving targets (15 meters, 35 meters, 75 meters, 185 meters) except the 125-meter target. This target could also be hit near the center if its speed were reduced from 8 miles per hour to 6 miles per hour. ARM moving target training materials currently are being revised, based on the decision to move from three moving target lead rules to this one lead rule. The Revised 25-Meter Scaled Simulated Moving Target is presented in Figure 6. It is like the original 25-Meter Scaled Simulated Moving Target in most respects. However, the new target presents silhouettes that appear to move at different angles relative to the firer, not just laterally. This change is more representative of targets seen in combat and simplifies training by requiring soldiers to learn only one sight rule instead of three.

Figure 6. Revised 25-Meter Scaled Simulated Moving Target

APPENDIX A

SUMMARY OF THE RELATIONSHIP BETWEEN SEVEN ADVANCED RIFLE MARKSMANSHIP TRAINING TASKS AND INFANTRY MISSIONS IN ARTEP 7-15

	Advanced Rifle Marksmanship Training Tasks						
Infantry Mission[1]	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Movement to Contact	X	X	X	X		X	X
Hasty Attack	X	X	X	X		X	X
Deliberate Daylight Attack	X	X	X	X		X	X
Night Attack	X		X		X	X	X
Attack of an Urban Area	X	X	X	X		X	X
Defense		X		X	X	X	X
Defense of an Urban Area	X	X	X	X		X	X
Night Withdrawal					X		
Delay	X	X	X	X		X	X
Raid	X	X	X	X		X	X
Airmobile Assault	X	X	X	X		X	X

[1] It does not appear that the mere presence or absence of particular rifle marksmanship training tasks is determined by the echelon of the unit. For this reason, Infantry missions are listed irrespective of echelon.

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Airmobile Reconnaissance in Force/ Night Attack	X		X	X	X		X
Airmobile Delay in Sector		X		X		X	X
Airborne Assault	X	X	X	X		X	X
Ambush Patrol	X	X	X	X		X	X
Medical Support							
Communication Support							
Logistical Support							
Maintenance Support							
Personnel and Administrative Support							
Screening Mission		X		X			
Area Reconnaissance	X		X				
Route Reconnaissance	X		X				
Zone Reconnaissance	X		X				
Scout Vehicle Crew Live-Fire Exercise							
Indirect Fire Support							
Antiarmor Fire Support							
Air Defense Support							
Antiarmor Ambush	X	X		X		X	X

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Area Reconnaissance Patrol	X		X				
Zone Reconnaissance Patrol	X		X				
Clear an Urban Area	X	X	X	X			
Forced March/Live Fire Exercise - Level 1				X			X
Forced March/Live Fire Exercise - Level 2				X			X
M60 Machinegun Live-Fire Exercise							
Demolitions Support							
Operate In, Cross, and Bypass Contaminated Area							X
Employ Chemical-Agent Alarm System							
React to a Chemical/ Biological Attack							X
React to Nuclear Attack							
Prepare for Friendly Nuclear Pulse							
Employ/React to Smoke					X		

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Cross a Water Obstacle							
Conduct a Passage of Lines							
Defend Against Air Attack	X	X					
Breach a Minefield							
Construct a Wire Obstacle							
Provide Operations Security (OPSEC)							
Operate in an EW Environment							
Treat/Evacuate Casualties							
Process Prisoners of War							
Emplace/Recover PSID/PEWS							
Employ Cover, Concealment, and Camouflage							

APPENDIX B

SUMMARY OF THE RELATIONSHIP BETWEEN SEVEN ADVANCED RIFLE MARKSMANSHIP TRAINING TASKS AND INFANTRY MISSIONS IN ARTEP 71-2

	Advanced Rifle Marksmanship Training Tasks						
Infantry Mission[1]	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Plan and Control Combat Operations							
Maintain Operations Security (OPSEC)							
Perform Tactical Intelligence Functions							
Conduct NBC Defense Operations							X
Defend Against Air Attack		X				X	X
Conduct Sustaining Operations							
Prepare for Operations							
Survive							
Move							

[1] It does not appear that the mere presence or absence of particular rifle marksmanship training tasks is determined by the echelon of the unit. For this reason, Infantry missions are listed irrespective of echelon.

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Attack (Tank Crew)							
Defend (Tank Crew)							
Tank Crew Firing Proficiency Exercise							
Attack (M113A1 Carrier Team)		X		X	X	X	X
Defend (M113A1 Carrier Team)		X		X	X	X	X
Carrier Team Firing Proficiency Exercise				X	X	X	X
Attack (M113A1 Maneuver Team-Dismounted)	X	X	X	X	X	X	X
Defend (M113A1 Maneuver Team-Dismounted)	X	X	X	X	X	X	X
M113A1 Dismounted Maneuver Team Firing Proficiency Exercise	X	X	X	X	X	X	X
Conduct Reconnaissance Operations	X		X		X		X
Conduct Screening Operations	X		X		X		X
Scout Firing Proficiency Exercise	X		X		X	X	X
Provide Antiarmor Support (TOW)							
Provide Indirect Fire Support (81mm/107mm)							

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Move (With Carrier)	X	X	X	X	X	X	X
Attack (With Carrier)	X		X	X	X	X	X
Defend (With Carrier)	X	X	X	X	X	X	X
Firing Proficiency Exercise (With Carrier)	X	X	X	X	X	X	X
Conduct an Antiarmor Ambush (With Carrier)	X	X	X	X	X	X	X
Move (Without Carrier)	X	X	X	X	X	X	X
Attack (Without Carrier)	X	X	X	X	X	X	X
Defend (Without Carrier)	X	X	X	X	X	X	X
Firing Proficiency Exercise (Without Carrier)	X	X	X	X	X	X	X
Conduct Area Reconnaissance Patrol (Without Carrier)	X		X		X		X
Conduct Ambush Patrol (Without Carrier)	X	X	X	X	X	X	X
Live Fire Attack (With Carrier)	X		X	X	X	X	X
Live Fire Defend (With Carrier)	X	X	X	X	X	X	X
Operate the Command Post							

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Perform Command, Control, & Planning Functions							
Perform Communications Functions							
Provide Communications Support							
Conduct Recovery and Evacuation Operations							
Evacuate Wounded Personnel							
Transport and Deliver Supplies							
Operate Trains							
Perform Administrative/Personnel Functions							
Perform Logistics Functions							
Conduct Field Feeding Operations							
Provide Maintenance Support							
Evacuate & Process Wounded Personnel							
Clear a Building	X		X	X	X	X	X
Defend a Building	X	X	X	X	X	X	X

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Attack an Urban Area	X		X	X	X	X	X
Defend an Urban Area	X	X	X	X	X	X	X
Conduct an Assault River Crossing	X	X	X	X	X	X	X
Conduct a Hasty River Crossing				X			
Conduct a Deliberate River Crossing				X			
Conduct an Airmobile Assault	X	X	X	X	X	X	X
Install a Hasty Protective Minefield							
Construct Obstacles							
Breach a Minefield				X		X	X
Breach Obstacles				X		X	X
Conduct a Raid (Mounted)	X	X	X		X	X	X
Conduct a Raid (Airmobile or Dismounted)	X	X	X		X	X	X
Secure Atomic Demolition Munitions							
Conduct Demolition Guard Force Operations	X	X	X	X	X	X	X
Conduct Area Protection/Area Damage Control Operations							

Infantry Mission	Advanced Rifle Marksmanship Training Tasks						
	Instinctive Automatic Fire	Sighted Automatic Fire	Quick Fire	Rapid Semi-Automatic Suppressive Fire	Night Fire	Moving Target Engagement	Firing With Protective Mask
Conduct Breakout from Encirclement	X	X	X	X	X	X	X
Conduct Passage of Lines (Rearward)							
Conduct Passage of Lines (Forward)							
Conduct a Relief in Place							
Occupy an Assembly Area							
Conduct Strategic Deployment							

APPENDIX C

HOW TO SHOOT MOVING PERSONNEL TARGETS WITH THE M16A1 RIFLE

Most of the personnel targets seen on the battlefield are moving. Moving targets are easier to detect than stationary targets. But they are harder to shoot. Information presented here will provide you everything you need to know to hit moving targets. It is up to you to practice what is written here so that you can apply this knowledge in the field.

The Four Fundamentals of Rifle Marksmanship

The four fundamentals of rifle marksmanship, which you learned previously, still apply to shooting moving targets. You need to get into a good steady position. You need to aim at your target. You need to control your breathing. And, you need to know how to squeeze the trigger. The difference is how you do these things. Techniques that you tried against stationary targets may not work against moving targets. Techniques that do work against moving targets are identified in the following paragraphs.

Steady Position

Steady position is the first shooting fundamental that you should learn. One key to holding the weapon steady is to fire from a stable position. Two positions are described here. One position, the foxhole semi-supported position, offers more stability and more freedom of movement than the other, the prone unsupported position. But both positions offer enough stability and enough freedom of movement to engage most moving targets.

Foxhole Semi-supported Position. Most firers prefer to shoot stationary targets from a foxhole supported position. But this position is not the best position to use against moving targets. The foxhole supported position is too rigid. It makes it virtually impossible to engage moving targets without shifting about in the foxhole. The best position to use against moving targets is the foxhole semi-supported position. This position is shown in Figure 7. The firer in the figure is seen bending forward slightly at the waist, but not enough to touch his chest or hips against the side of the foxhole. His weight is evenly distributed over his feet. The front end of his weapon is fully supported by the sandbags, with his nonfiring hand resting, totally relaxed, between the rifle handguard and the sandbags. The rear of the weapon is firmly supported by the firing hand and the pocket of his firing shoulder. The firing arm is unsupported and held at a natural angle from the body.

Firing effectiveness against moving targets depends heavily on the amount of balance you can maintain while firing; this is before, during, and after each shot. Start with a normal standing position, feet squared with the shoulders. Then, adjust the height of your sandbags so that, when you lean forward into the rifle, you can rest your nonfiring hand on the sandbags without putting any unnecessary strain on your legs. Keep your chest and

hips free from the side of the foxhole. Outside the foxhole, look for any object about chest height that can support your nonfiring hand and rifle, for example, a low wall, tree limb, or window ledge. If support is not readily available, use an unsupported position. But if it is available, use it. It will greatly increase your chances of hitting a target.

Slight adjustments in your height relative to a supporting object are simple to make. For relatively low supporting objects, bend forward more at the waist and move your feet farther apart. Do not bend at the knees any more than is necessary for comfort. Bending at the knees puts unnecessary strain on the leg muscles and results in an unsteady position. For relatively high supporting objects, stand more erect, and move your feet closer together. Large adjustments in posture, probably, are not worth it. Instead, change your firing position; for example, by assuming a kneeling semi-supported position. Uncomfortable firing positions usually are difficult to maintain and, when firing, may cause you to lose your balance. The key is to find a position that will enable you to maintain your balance while engaging targets moving in any direction: right to left, left to right, toward you, or away from you.

Prone Unsupported Position. Unsupported means that the rifle is supported by the nonfiring arm and hand, and not by any other object (sandbags, logs, etc.). The prone unsupported position is shown in Figure 8. The firer has both elbows planted on the ground. His nonfiring elbow is placed as far as possible under his rifle and his firing elbow is squarely in front of his firing shoulder. His body is positioned directly behind the rifle, and his legs are spread a comfortable distance apart. The rear of the weapon is supported by the firing hand and the pocket of the firing shoulder.

Aiming

Moving target shooting is all very rapid. It is a matter of a few seconds at most. One key to success in shooting moving targets is preparation. In the foxhole, being prepared means: (1) maintaining a good foxhole semi-supported position, (2) scanning for targets over the sights, both eyes open, and (3) keeping some part of your cheek in contact with the stock (stockweld). It also means staying alert. You must see the target at the earliest point possible and react to it immediately.

The initial aiming process involves shifting the sights rapidly toward the aiming point. The nonfiring eye is closed during this process. Focus is directed toward the tip of the front sight post, not toward the target. Speed in the initial aiming process is very important, but it should not come at the expense of control. This means moving your sights quickly and smoothly. Do not jerk into your firing position.

Except for targets moving directly toward or away from you, some amount of lead is required. This is, your aiming point will be somewhat in front of the target's center of mass. Lead is estimated using the rifle's front sight post. The exact amount of lead required depends on a host of factors. But it depends most heavily on the speed at which the target is moving laterally, left to right or right to left. Targets coming directly toward or away from you are not led, regardless of how fast they may be traveling. This is because they have no lateral movement.

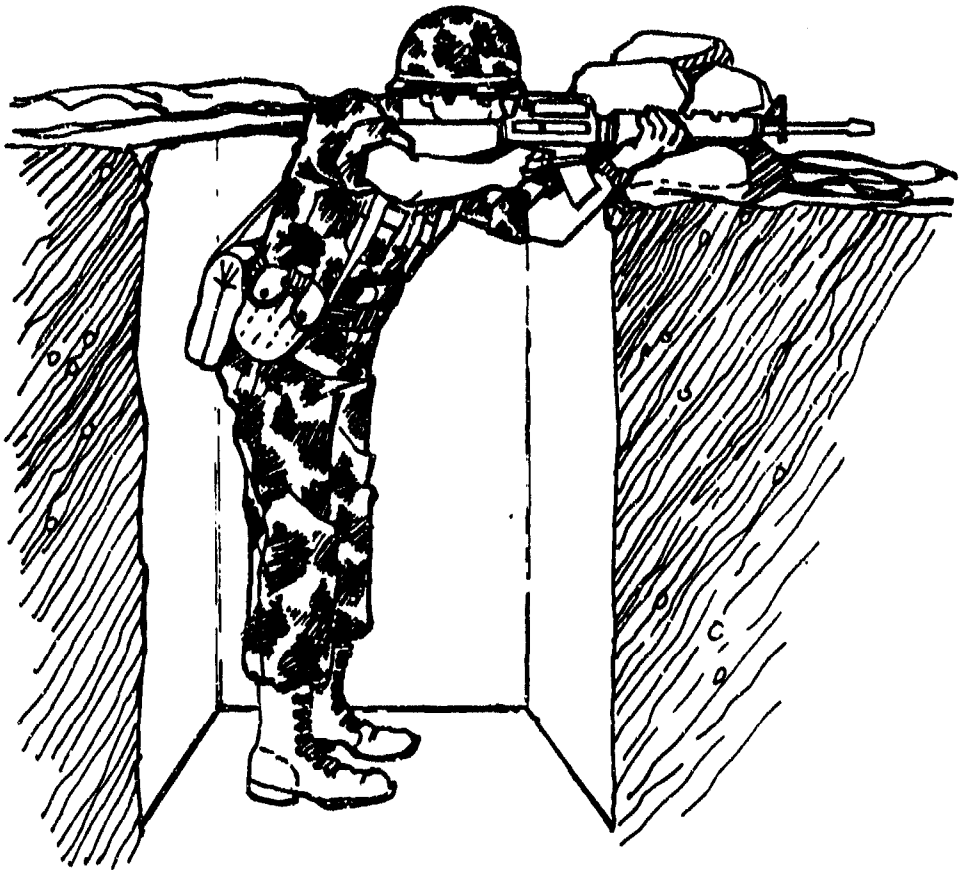

Figure 7. Foxhole Semi-supported Firing Position

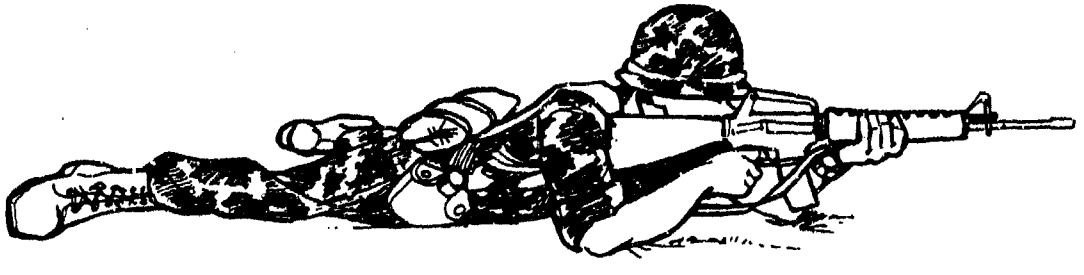

Figure 8. Prone Unsupported Firing Position

Slow moving targets, such as targets walking left or right or right to left, can be hit by placing the trailing corner of the front sight post against the target's center of mass. Faster moving targets, such as targets walking quickly or jogging left to right or right to left, can be hit by placing the trailing corner of the front sight post against the lead edge of the target. Targets running left to right or right to left can be hit by leading the target the same distance as one half the perceived width of the front sight post. In other words, in aiming at running targets, you should try to make the gap between the trailing corner of the front sight post and the target appear one-half the width of the front sight post. These are general rules and intended only to give you an initial point of aim. There are exceptions to these rules, like most other rules.

Learn these rules so that when a target appears, you can apply the correct lead instantly without thinking about it. You are not going to hit moving targets unless you know where to aim, and can get there quickly.

Breath Control

In firing at stationary targets during BRM, you learned to control your breathing. You were taught to inhale and exhale normally, holding your breath and firing at the moment of natural respiratory pause. In firing at moving targets, you no longer have this luxury. You must learn to hold your breath the instant the target appears and continue to hold it until you have completed firing. You have no choice. Moving targets seen in combat can appear without warning, move, and disappear in a matter of seconds. There is no time to wait for a natural respiratory pause or to take a deep breath.

You must learn to stop breathing immediately. Try it as you dry fire with your rifle. Practice it until it becomes a natural part of the firing process, something you can do without thinking about it.

Trigger Squeeze

One of the most frequent mistakes shooters make when engaging moving targets is jerking the trigger. This is understandable. Moving targets can seem like shooting stars when you are trying to get them in your sights. They are in your sights one instant, and out the next. When you do see what you want, it is very tempting quickly to jerk the trigger. The shooter thinks, "Hurry up, shoot now, quick or the target will get away!" He gets the target in his sights, jerks the trigger, the muzzle moves, the shot misses, and the target gets away.

The easiest way to avoid this mistake is to apply some initial pressure to the trigger, enough to make it feel tight against your tensed trigger finger. When you see a target, start applying this pressure. As soon as you acquire the correct sight picture, finish applying it. There is little harm in firing quickly as long as you begin with a fair amount of pressure on the trigger.

Tracking, Trapping, and Follow-Through

The two basic techniques used to shoot moving targets are tracking and trapping. Tracking involves moving the muzzle of the weapon with the target, and it is the preferred approach. Trapping involves holding the muzzle in front of the target and waiting for it to pass through the sights.

Tracking should be emphasized in lecture. It also should be trained using the DRY MOVER. It is probably the better technique to use for engaging the 75-meter IRETS target, at least from the foxhole semi-supported position.

The soldier should be acquainted with trapping. Some situations appear far better suited to trapping than tracking. For example, some shooters feel that slower moving targets are easier to trap than to track. At a minimum, the soldier should be told that trapping is an option open to him, something that can be tried if a target appears difficult to track smoothly.

Follow-through involves continuing to track the target for a brief moment after you shoot. Follow-through is important for two reasons. Many targets are missed by shooting behind the target, because the shooter tends to slow or stop his track just as the trigger is squeezed. Follow-through helps prevent this mistake. It helps you hold your aim when you need it the most, the moment the shot is fired. A smooth follow-through also is important if the first shot is missed. It helps keep your sights lined up with your aiming point for the next shot.

In the foxhole semi-supported position, a smooth track and follow-through can be accomplished simply by shifting your weight in the direction opposite to the target's direction. As weight is shifted, the weapon automatically pivots in the nonfiring hand, making it possible to keep your sights on your aiming point.

Shifting your weight in the direction opposite the target's direction is not nearly as difficult as it may seem. For targets moving left to right, you need only sway your hips to the left or lock your right leg back at the knee while flexing your left leg. Either action will cause the muzzle of your weapon to pivot to the right. For targets moving right to left, shifting your weight in the opposite direction will cause the weapon to pivot to the left. The faster you shift your weight, the faster the muzzle will move. By starting out with your weight evenly distributed, you should be able to track targets moving in either direction. By locking one leg back at the knee, you develop straight-line bone support for your body. Bone support provides more stability than could ever be achieved if both legs were bent and supported totally by the muscles.

The nonfiring hand serves two functions when firing from the foxhole semi-supported position. First, it provides a pivot point for the rifle. Normally, the pivot occurs automatically as body weight is shifted. When body weight is fully shifted and the pivot of the rifle is complete, tracking can be continued briefly by rolling the fingers of the nonfiring hand up and flexing the wrist toward the thumb. The nonfiring hand remains well-supported throughout this movement. The nonfiring hand can also be used to make large,

rapid changes in an aiming point. Normally, the resting position of the nonfiring hand shifts during this process. The ability to make large, rapid changes in an aiming point is important when engaging multiple targets or fast-moving, close-up targets.

When shooting moving targets from the prone unsupported position, the nonfiring hand grasps the rifle handguard. Tracking is accomplished by moving the nonfiring hand and using the nonfiring elbow as the primary source of support for the rifle. The nonfiring elbow is placed as far as possible under the rifle. The firing elbow is placed squarely in front of the firing shoulder. This position makes it relatively easy for right-handed firers to track targets moving right to left. Left-handed firers find it easier to track targets moving left to right.

The prone unsupported position makes targets moving left to right (right-handed firers) or right to left (left-handed firers) almost impossible to track smoothly, at least for any great distance. Some of these targets must be trapped. This can be accomplished most easily by rapidly shifting your point of aim slightly ahead of the target using the nonfiring hand.

Summary

Remember the four fundamentals of rifle marksmanship which you learned previously, because they still apply to shooting moving targets.

Steady Position

You need to get into a steady position, but you need enough freedom of movement to engage targets moving in any direction. You probably will get the best results using a foxhole semi-supported position. It offers support for the nonfiring hand, which can be used as a pivot point for the rifle, and enables you to shift your weight smoothly and evenly from one leg to the other. Shifting your weight in this way makes it relatively easy to keep a smooth track and follow through. The prone unsupported position uses the nonfiring elbow as the primary source of support. It makes it virtually impossible to track targets moving left to right (right-handed firers) or right to left (left-handed firers). At least some of these targets must be trapped.

Aiming

The initial aiming process must be accomplished as rapidly as possible while maintaining control. The sights must end up on or close to the aiming point. The exact amount of lead required depends on a host of factors, key among which is the speed the target is moving laterally. Lead can best be estimated using your rifle's front sight post. General rules for leading moving targets were presented.

Breathing

The instant a target is sighted, breathing must be stopped. There is no time to wait for a natural respiratory pause.

Trigger Control

Jerking the trigger is one of the main problems shooters experience in attempting to hit moving targets. The best way to overcome this problem is to apply some initial pressure on the trigger. There is little harm in firing very quickly if initial pressure is applied.

APPENDIX D

THEORETICAL LOCATION OF BULLET IMPACT ON A MOVING PERSONNEL TARGET USING VARIOUS LEAD RULES

The rationale for the utilization of a single lead rule for moving targets was based on a trigonometric analysis of a variety of lead rules. Nine lead rules were subjected to an analysis which included the variables of rate of target movement (one to eight miles per hour), angle of movement (5 to 90 degrees), range to target (15 to 450 meters), size of the front sight post (standard and Low Light Level Sight System), and the velocity of the 5.56 mm M16A1 projectile. The following lead rules were analyzed:

Rule 1 Align the trailing edge of the front sight post with target center.

Rule 2 Same as Rule 1 using the front sight post of the Low Light Level Sight System (LLLSS).

Rule 3 Front sight post centered on leading edge of the target.

Rule 4 Align the trailing edge of the front sight post with the leading edge of the target.

Rule 5 Same as Rule 4 using the LLLSS.

Rule 6 Aim one half of a front sight post width in front of the target.

Rule 7 Same as Rule 6 using the LLLSS.

Rule 8 Aim a full front sight post width in front of the target.

Rule 9 Same as Rule 8 using the LLLSS.

It was found that Rules 1 and 2 were the optimal lead rules to use, given that a single lead rule was needed to simplify training and maximize the number of high-priority target hits (out to 200 meters). Complete data, covering all rules and all ranges, are on file at the ARI Field Unit, P. O. Box 2086, Fort Benning, Georgia 31905.